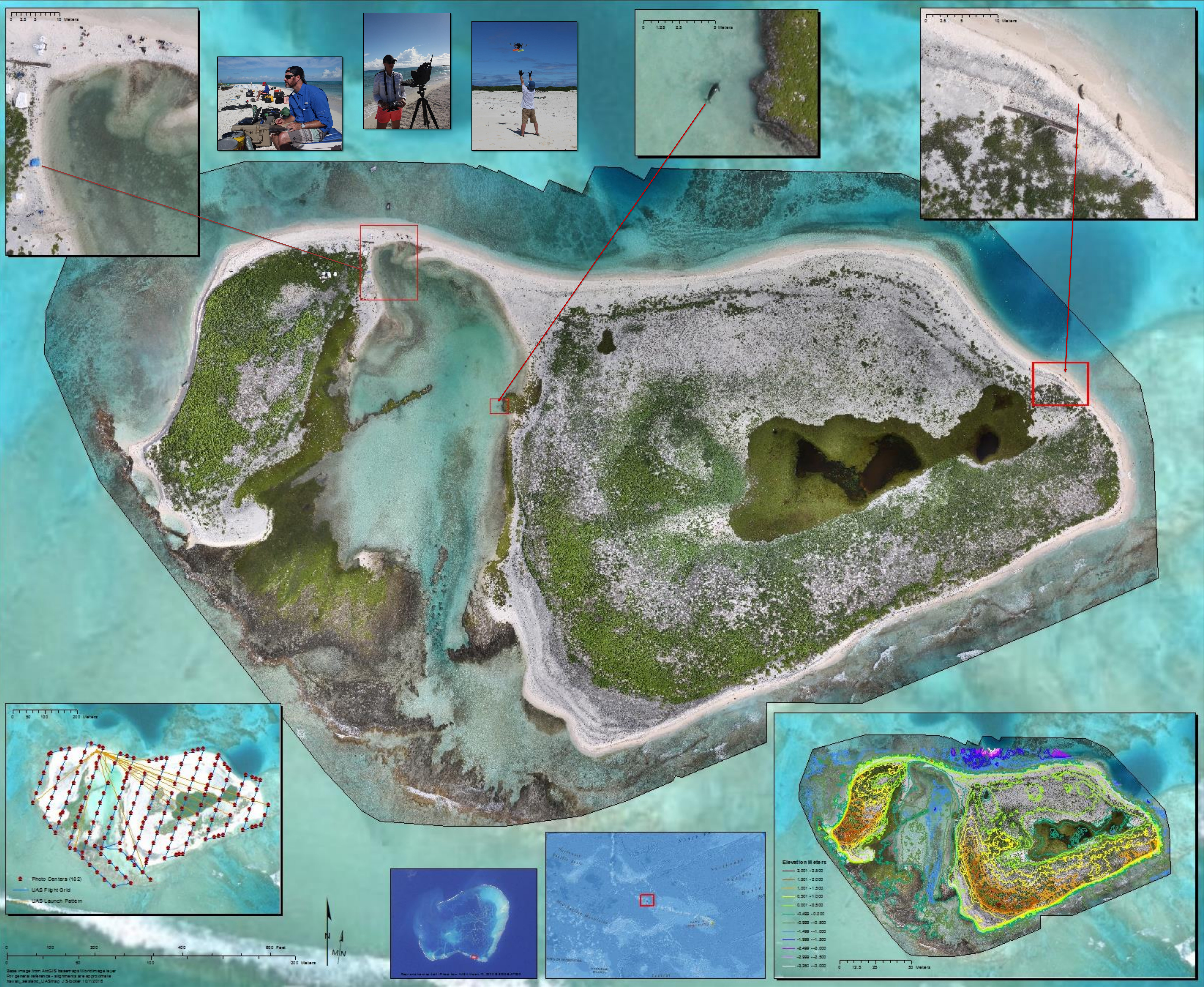


HAWAIIAN MONK SEAL POPULATION MONITORING AND HABITAT MAPPING IN THE NORTHWESTERN HAWAIIAN ISLANDS USING THE APH-22 HEXACOPTER



Southeast Island in the Pearl and Hermes Atoll, Hawaii
APH-22 hexacopter (Mikrokopter avionics)
Orthomosaic processing through Pix4DMapper by Pix4D
Flight Date: September 20, 2015
Resolution: 2.5 cm/pixel

UAS planning and flight: Kathryn Sweeney NOAA, Don LeRoi of AIS
Mission support: Charles Littnan NOAA, Jessica Lopez Bohlander NOAA, LT Michael Marino NOAA
Map compilation: Joel Stocker for AIS

The final coverage after processing is 65.9 acres with a resolution of 2.5 cm per pixel. Camera settings were shutter priority with an exposure of 1/2000 seconds and the photograph resolution was 4608 x 3456 pixels. The flight grid was planned for a 60 by 60 percent overlap. With the Canon EOS M 22 mm lens and a flight altitude of 120 meters (400 feet) the result was a spacing of approximately 48 by 32 meters between waypoints for a grid count of 153, each covered an approximate area of 120 x 80 meters on the ground. Additional photographs were captured between grid positions while in flight, a total of 182 were used for processing.

Full coverage of the grid required eight flights averaging 12 minutes each - the shortest 8 minutes, highest 13. The total time to cover the island, including flights and battery exchange, was just over 2 hours. Reducing the wait time at waypoints, increasing flight speed, and improved shutter techniques can reduce the time and number of flights required.

Background

NOAA’s Hawaiian Monk Seal Research Program, in collaboration with staff from SWFSC, AFSC, and NOAA AOC, has been exploring the use of unmanned aerial systems to study endangered monk seals and their habitats across the Hawaiian archipelago.

Methods

In 2015, the team tested the APH-22 Hexacopter at several locations in the Northwestern Hawaiian Islands to assess disturbance to wildlife (birds and seals) and the platforms utility in surveying monk seals and mapping habitat. The mapping project shown here occurred at Southeast Island, Pearl and Hermes Reef, approximately 2,090 km northwest of Honolulu.

Waypoint mapping missions were flown at 400 feet to capture images using a Canon EOS M with a 22 mm lens. Observations of seal and bird response/interactions were recorded during each flight.

Preliminary Results and Discussion

Mapping surveys were successful with the ability to:

- detect seals and determine size
- map and identify vegetation type
- accurately map coastlines for erosion studies

Wildlife disturbances were minimal. Monk seals showed no response to APH-22 operations. Multiple species of bird showed a flushing response during take-off most often when the hexacopter reached 40-60 feet altitude. Most birds settled within a minute after disturbance.